Ground-based Observational Constraints on the Galileo Probe Entry Site Cloud Structure

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We report the first absolutely-calibrated near-infrared high-spatial resolution images of 5 μm hot spots on Jupiter as observed with NSFCAM, the near-infrared facility camera at the NASA/IRTF. Of particular interest, near-infrared absolute reflectivities are reported for the hot spot associated with the Galileo Probe Entry Site (PES) between October 1995 and July 1996, shortly after which it disappeared. Results are reported for $\sim$1.5%-wide CVF filters at 1.58, 1.75, 1.79, 1.85, 2.00, 2.03, 2.07, and 2.27 μm and two special $\sim$0.15-μm-wide filters placed at 1.58 and 2.27 μm.

Our results support the preliminary finding that the Galileo probe entered an unusual region on Jupiter (Orton *et al. Science* **272**, 839). At 1.58 μm, the PES is one of the darkest regions on the planet, reflecting only $\sim$53% of the incident light, only $\sim$80% as much as the equatorial clouds. At 4.78 μm, the same region is the brightest feature, emitting almost 3 times as much flux as the surrounding clouds. We find that the PES is $\sim$88% as reflective as the brighter surrounding clouds at the 2.00, 2.03, and 2.07 μm CVF filters, pseudo-continuum wavelengths which probe a few bars into Jupiter's atmosphere. In the strong methane bands at 1.75, 1.79, and 1.85 μm, which probe the upper atmosphere near 20 mbar, we find that the PES is $\sim$82% as reflective as the surrounding cloud region.

We present models of the PES cloud properties developed from these reflectivities, using the measured altitude dependence of a thin cloud near $\sim$1.5 bars detected by the Galileo Probe Nephelometer (Ragent *et al. Science* **272**, 854). Our dataset allows us to characterize the vertical structure of the atmosphere from the stratospheric haze, above the Nephelometer data region, down to a few bars. In combination with datasets in the visible and thermal wavelengths, we place constraints on the particle size and column density of various clouds layers within the PES hot spot.

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